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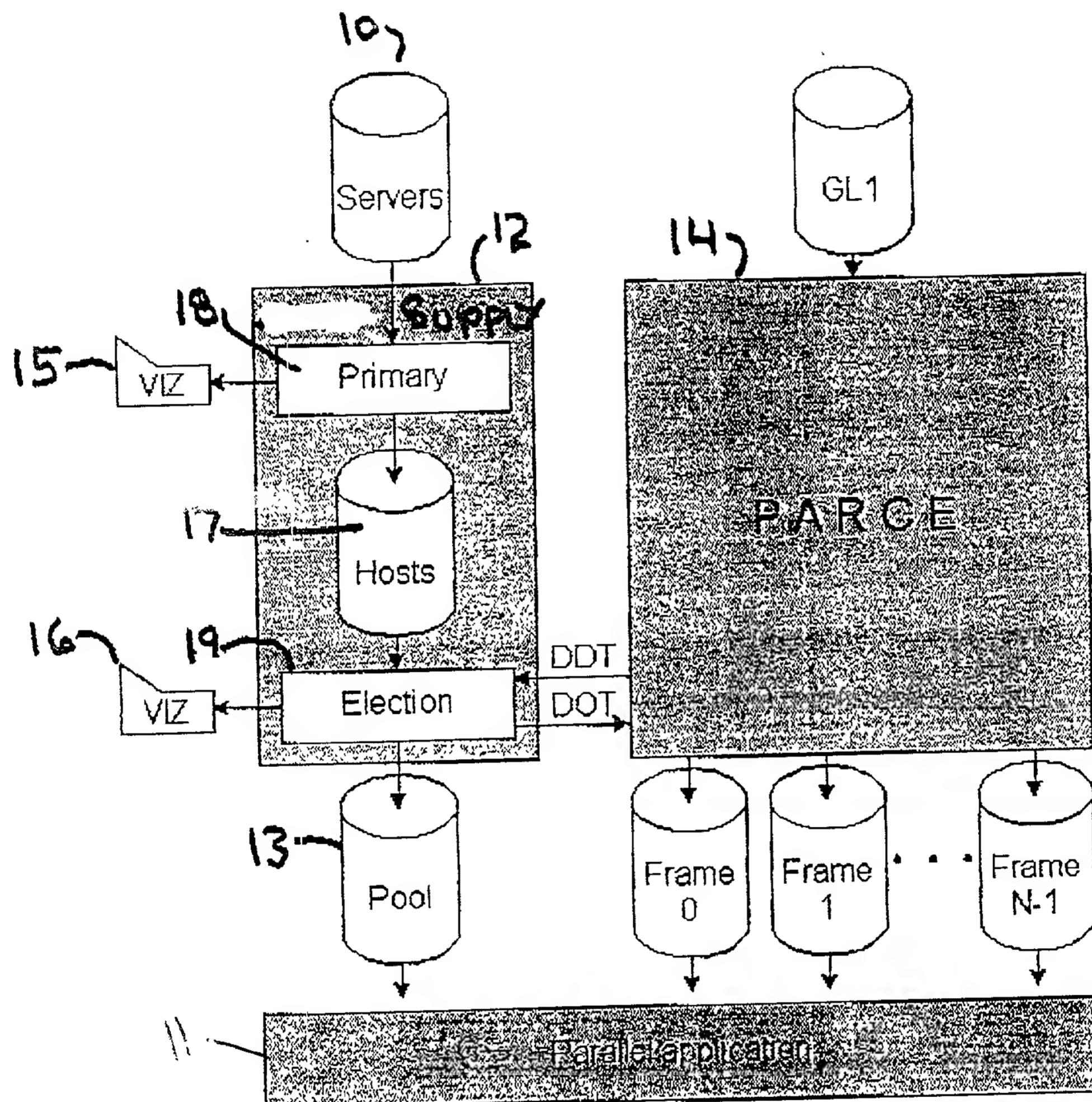


FIGURE 1

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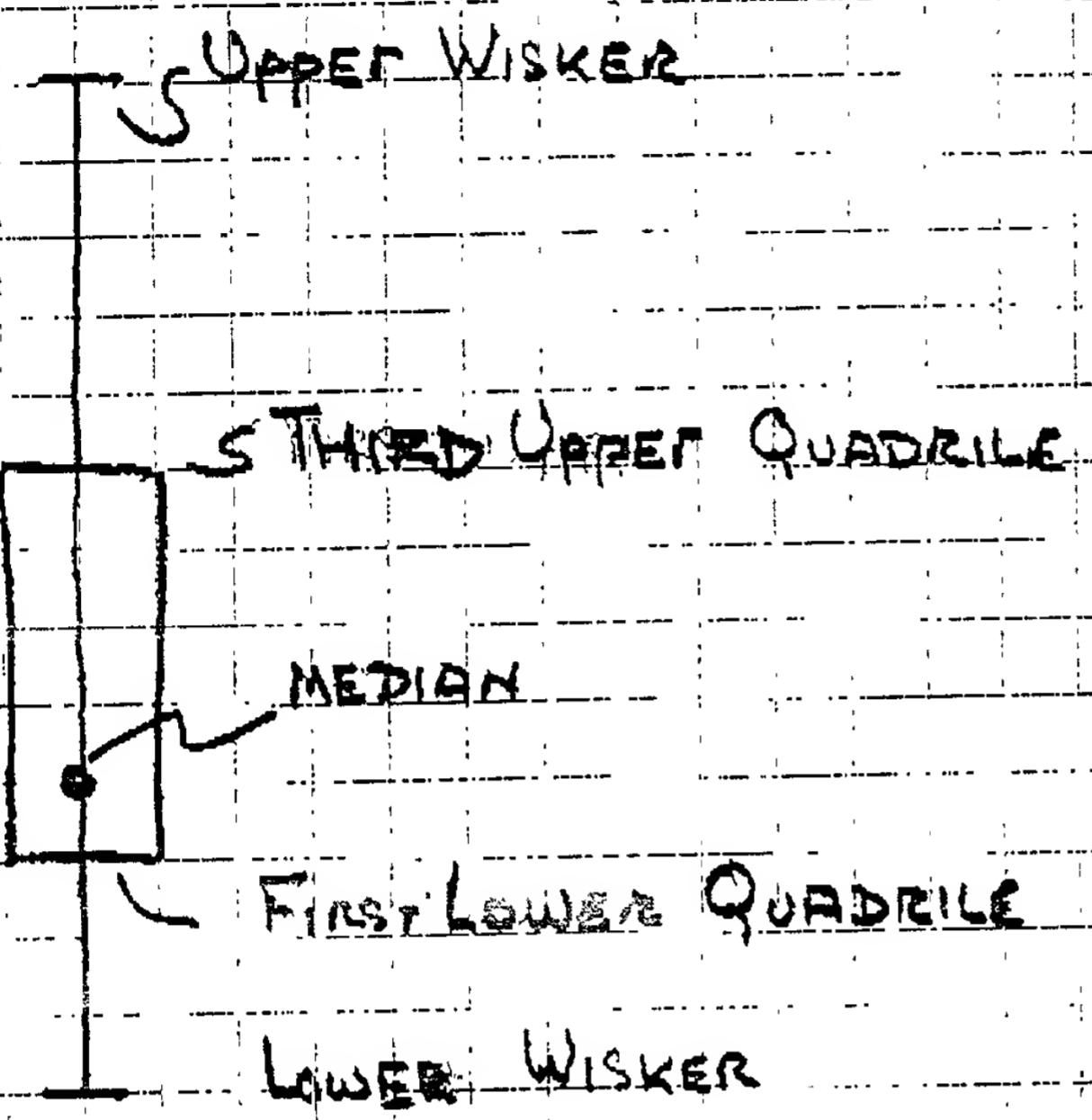


FIGURE 2

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COST-OF-SUPPLY (SUPPLY)

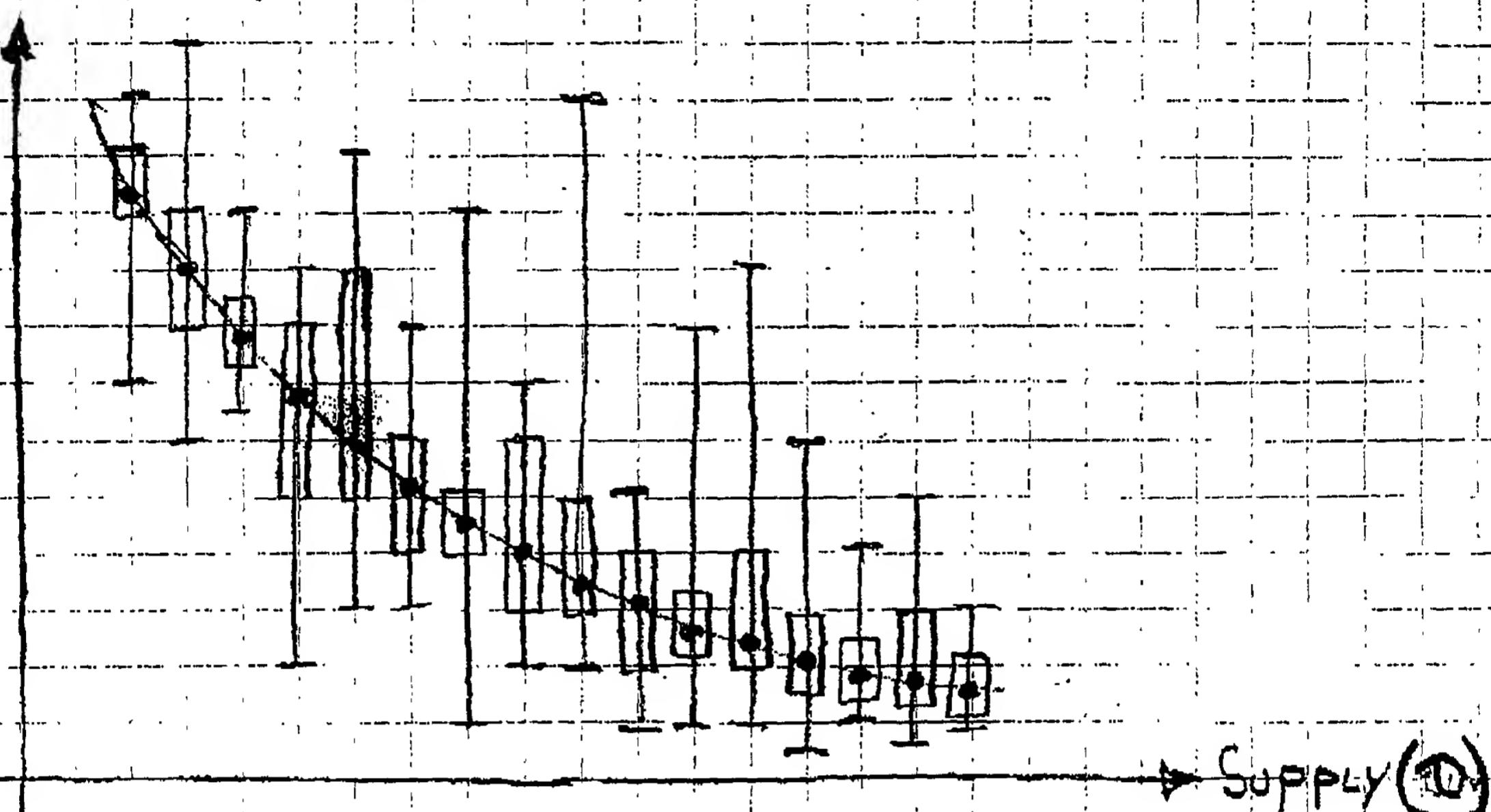


FIGURE 3

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Supply( $t$ ) = CAPACITY - UTILIZATION( $t$ )

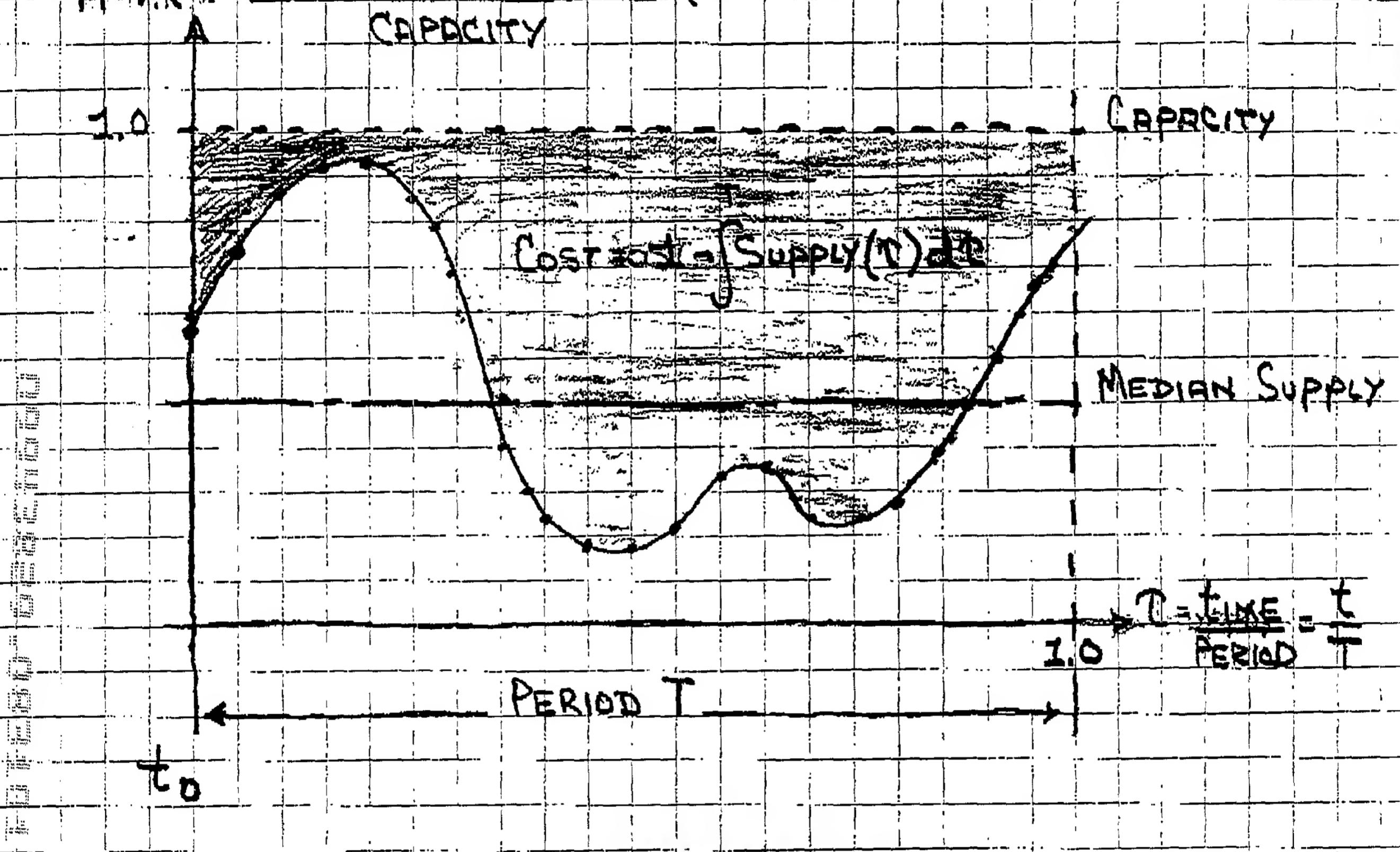
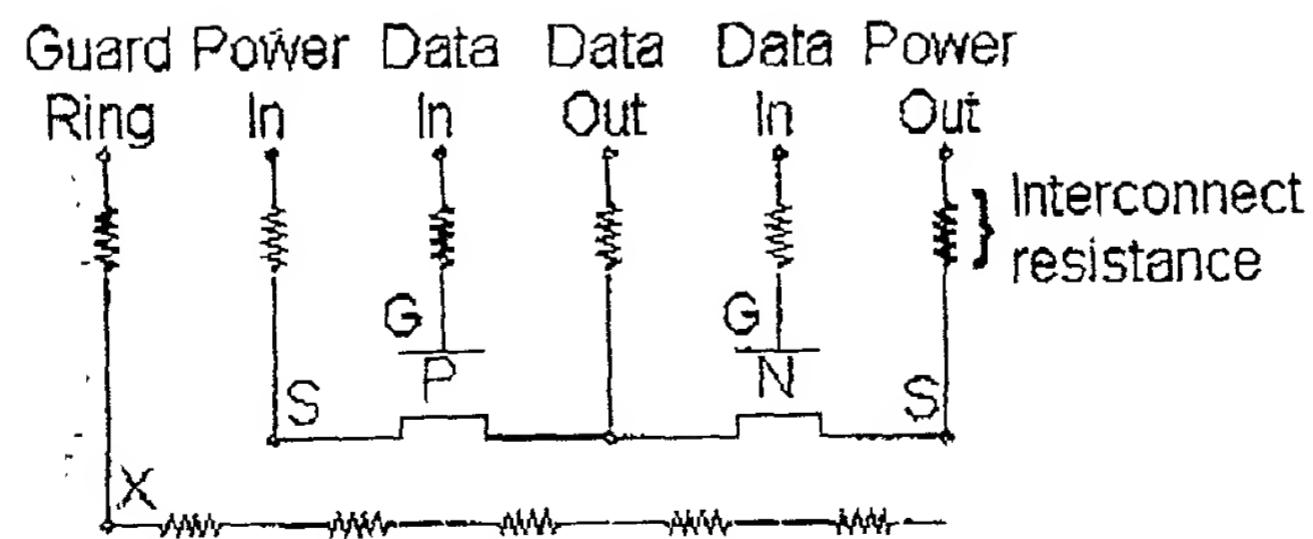
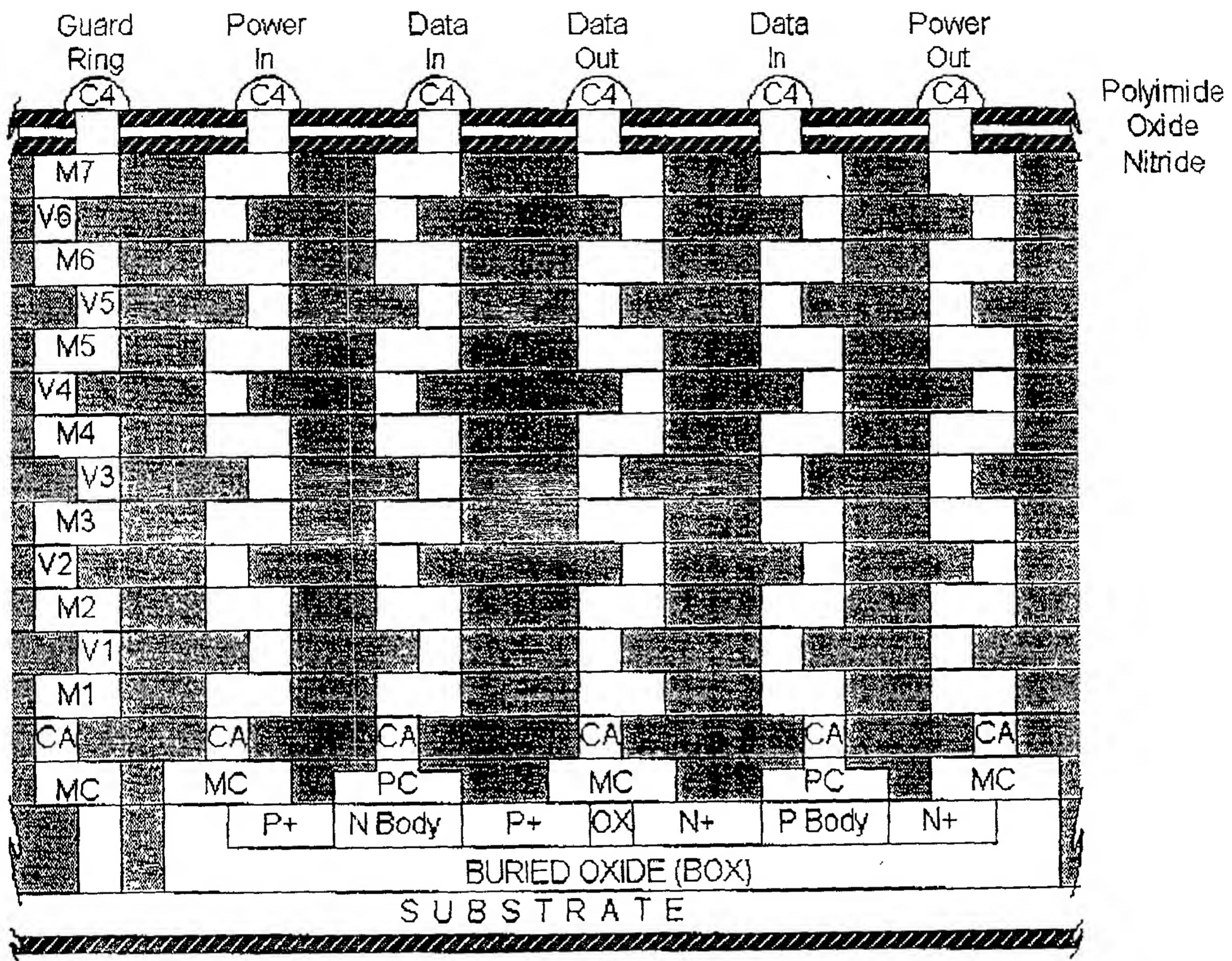
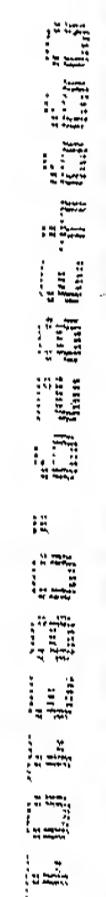


FIGURE 4

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# FIGURE 5

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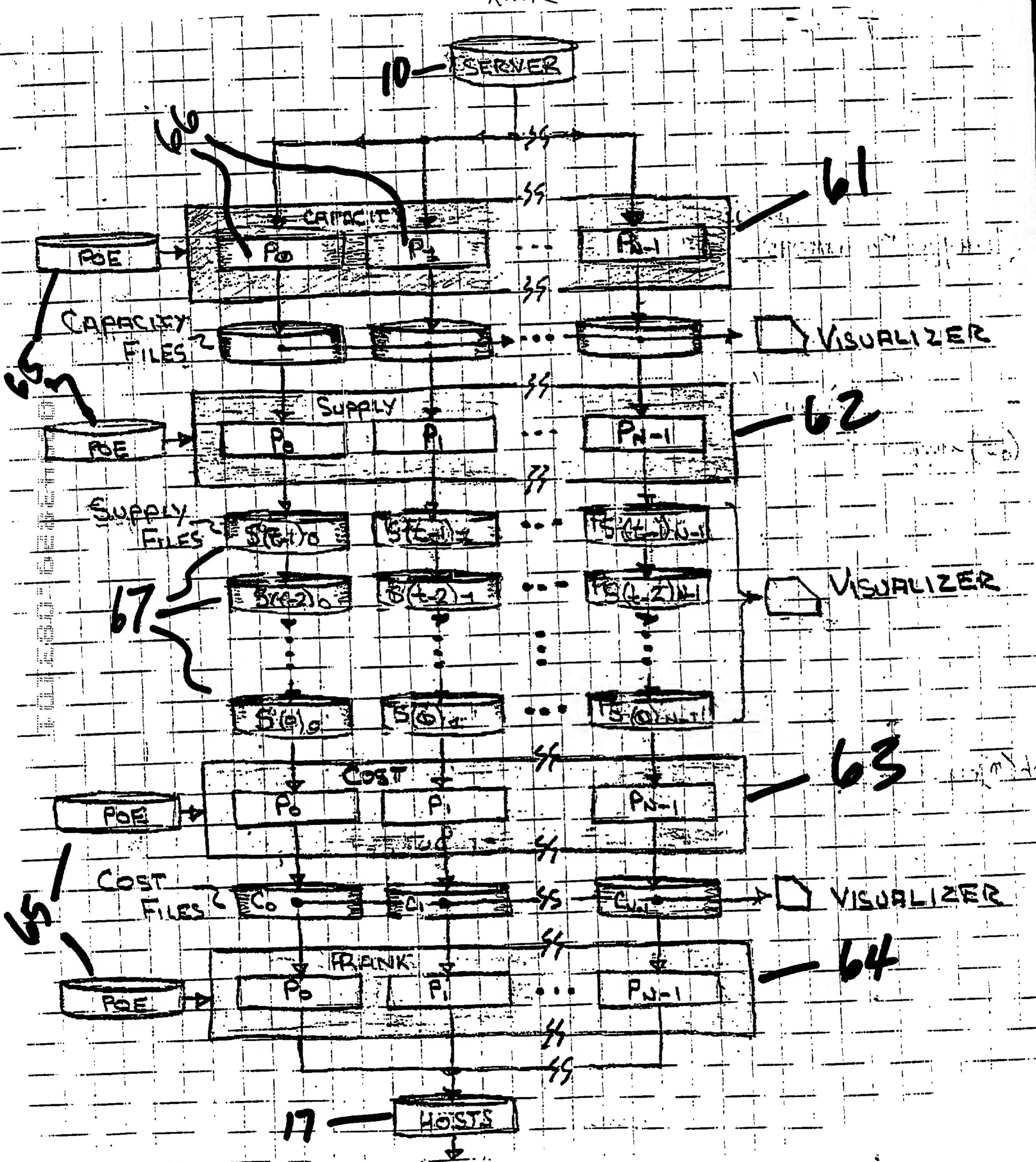


FIGURE 6

START

HOSTS

CAPACITY

UTILIZATION( $t_0$ )SUPPLY( $t_0$ )t\_i < T  
YESUTILIZATION( $t_i$ )SUPPLY( $t_i$ )COST( $t_i$ )RANK( $t_i$ )SUPPLY( $t_i$ )

Hosts,      Dimension:  $0 \leq \text{Host}(i) \leq \text{Server}(N)$  [1]  
 Where      Unit Scalar  
 Form: Time independent vector(i).  
 $0 \leq i \leq M \leq N$

$\vec{\text{Capacity}}_i = (\text{CPU, memory, temp file, cache page})$ , [2]  
 Where      Dimensions: CPU, data, data, data  
 Units: Scalar, byte, byte, byte  
 Form: Time independent, ix4 matrix

$\vec{\text{Utilization}}(t_0)_i = (\text{CPU, mem, tmp, page})(t_0)_i$ , [3]  
 Where      Dimensions: CPU, data, data, data  
 Units: Scalar, byte, byte, byte  
 Form: Time dependent, ix4 matrix

$\vec{\text{Supply}}(t_0)_i = \vec{\text{Capacity}}_i - \vec{\text{Utilization}}(t_0)_i$ , [4]  
 Where      Dimensions: CPU, data, data, data  
 Units: Scalar, byte, byte, byte  
 Form: Time dependent, ix4 matrix

Where  $0 \leq i \leq$  Sampling period T

Utilization( $t_i$ )

$\vec{\text{Supply}}(t_i)_i = (\vec{\text{Capacity}}_i - \vec{\text{Utilization}}(t_i)_i)$  [4a]

$\vec{\text{Cost}}_i = 1 - \int \vec{\text{Supply}}(t_i)_i \cdot d_i$  [5a]

Where      Dimensions: None, none, none, none  
 Units: Scalar, scalar, scalar, scalar  
 Form: Time dependent vector ( $t_i$ )

$\vec{\text{Rank}}(t_i)_i = \text{Sort}[\vec{\text{Value}}(t_i)]$

[6a]

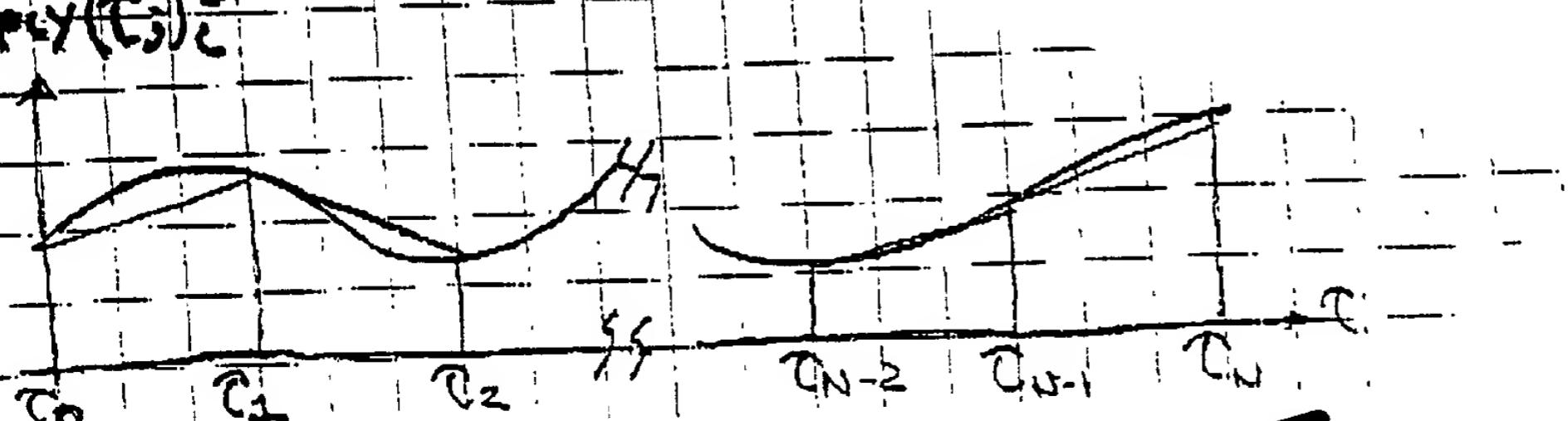


FIGURE 7

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CAPACITY



FIGURE 7A

CAPACITY

CAPACITY

$$\text{AREA} = \text{CAPACITY} \times T_1$$

$$= 200 \times 40 = 8000$$

100 0.25

$$\text{AREA} = \text{CAPACITY} \times T_2$$

50 0.25

$$= 10 \times 1.0 = 1.0$$

10 0.25

$$0.25 \text{ 1.0 } t_{AV} = \frac{t}{T_1}$$

$T_1$

FIGURE 7B

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$$\text{SUPPLY}(t) = \text{CAPACITY} - \text{UTILIZATION}(t)$$

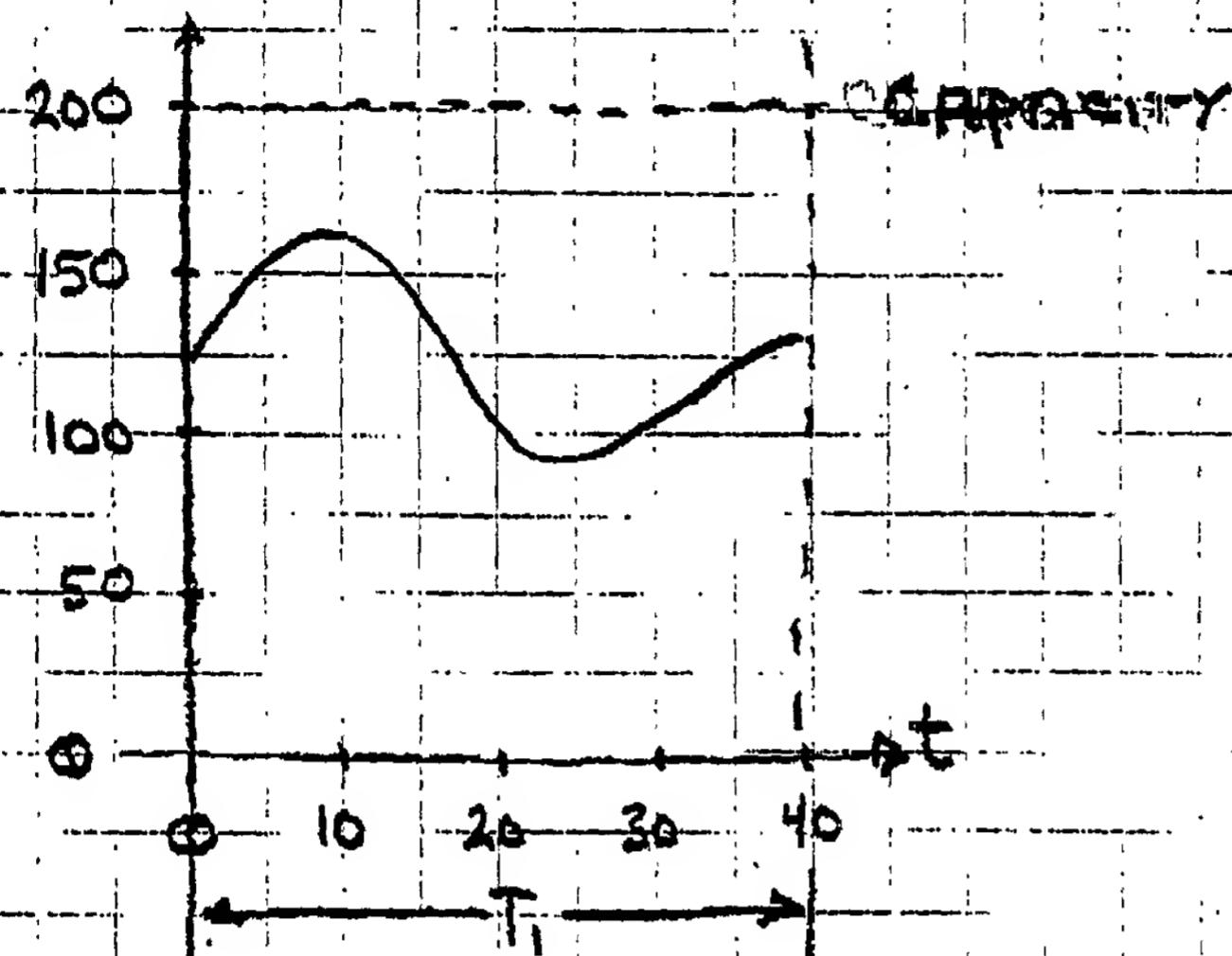


FIGURE 7C

$$\text{SUPPLY}(c) = \text{CAPACITY} - \text{UTILIZATION}(c)$$

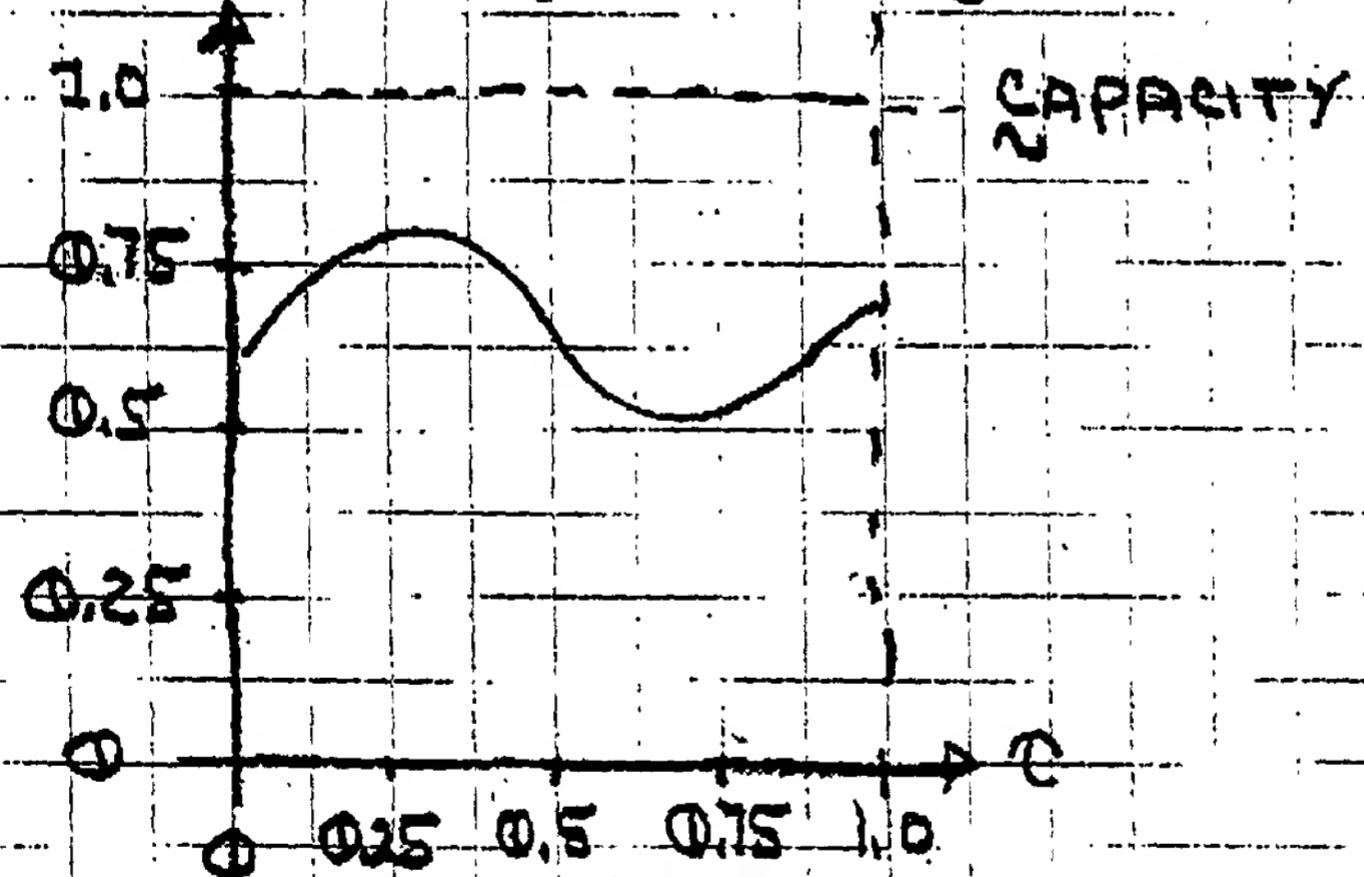


FIGURE 7D

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$$\frac{d \text{COST-OF-SUPPLY}(t)}{dt} \uparrow \Rightarrow \uparrow \text{SUPPLY}(t)$$
$$\therefore \text{COST-OF-SUPPLY} = \text{SUPPLY}(t)$$
$$\frac{d \text{COST-OF-SUPPLY}(t)}{dt} \downarrow \Rightarrow \uparrow \text{SUPPLY}(t)$$

FIGURE 7E

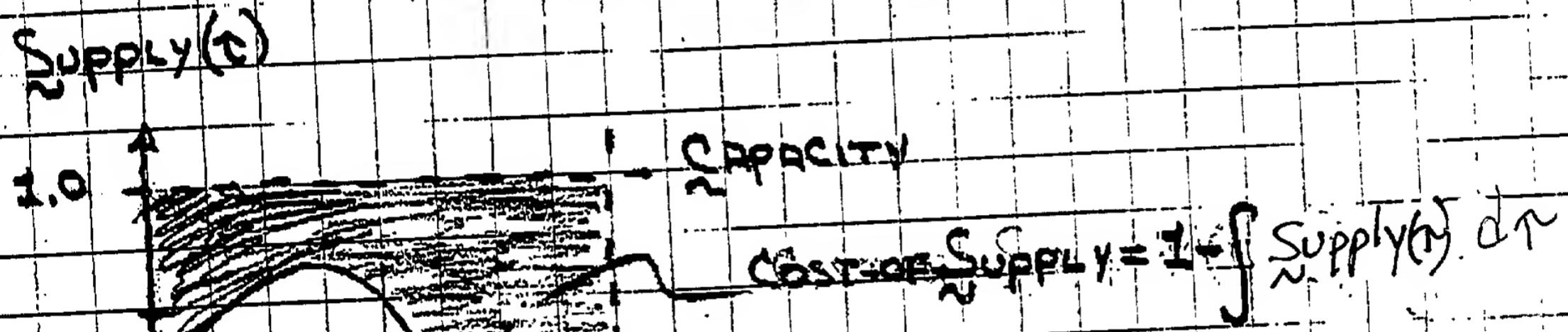


FIGURE 7F

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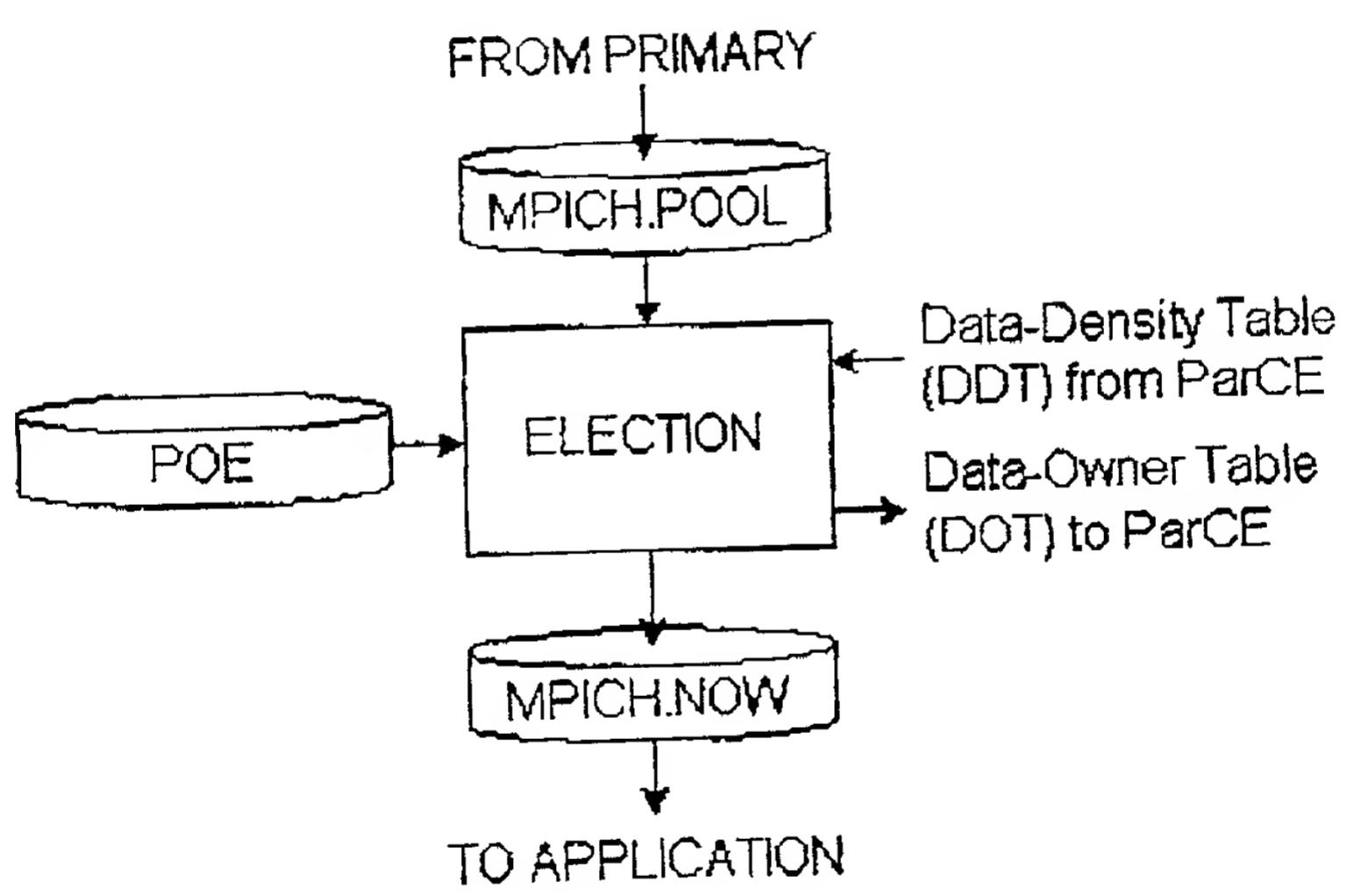


FIGURE 8

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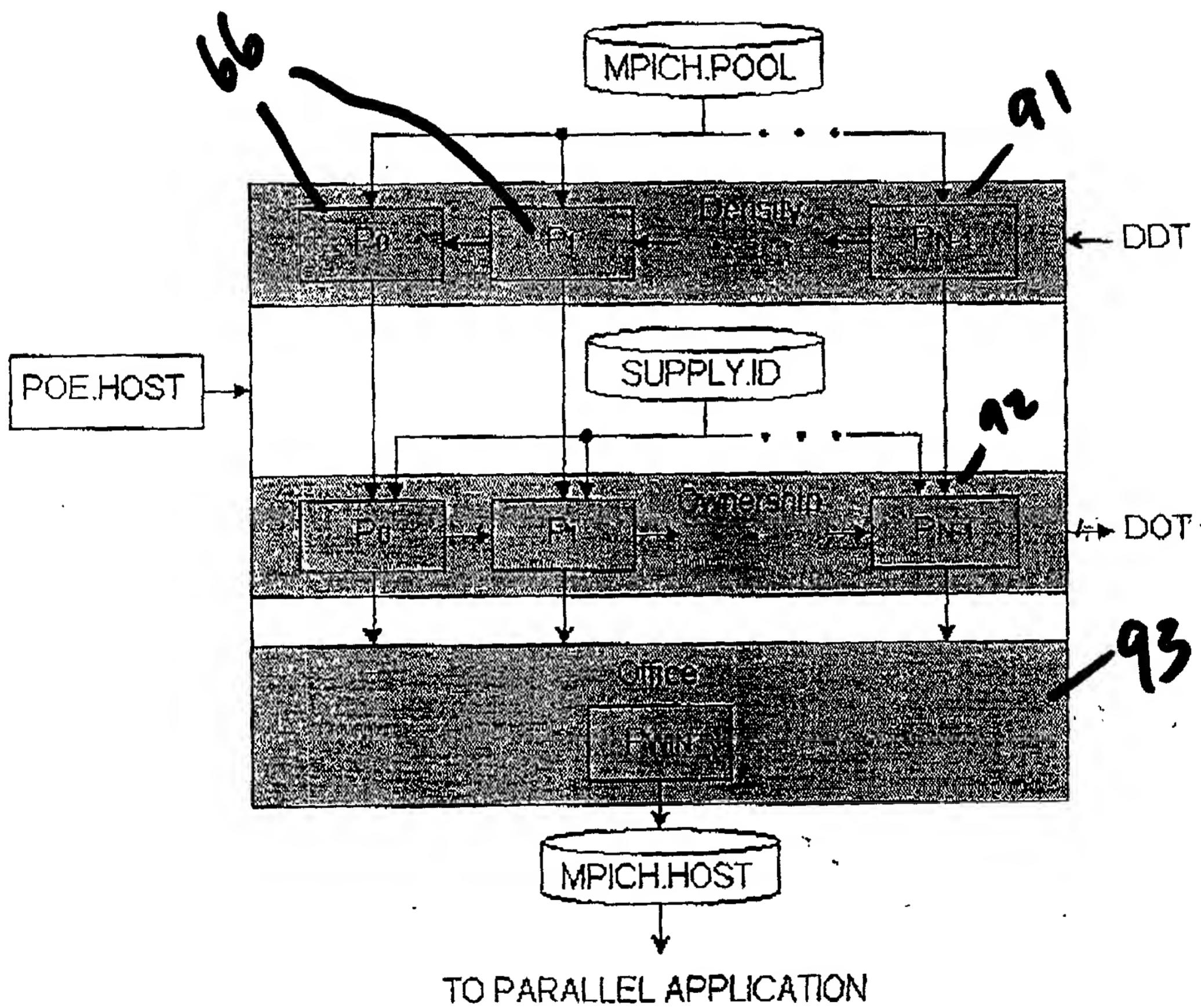


FIGURE 9

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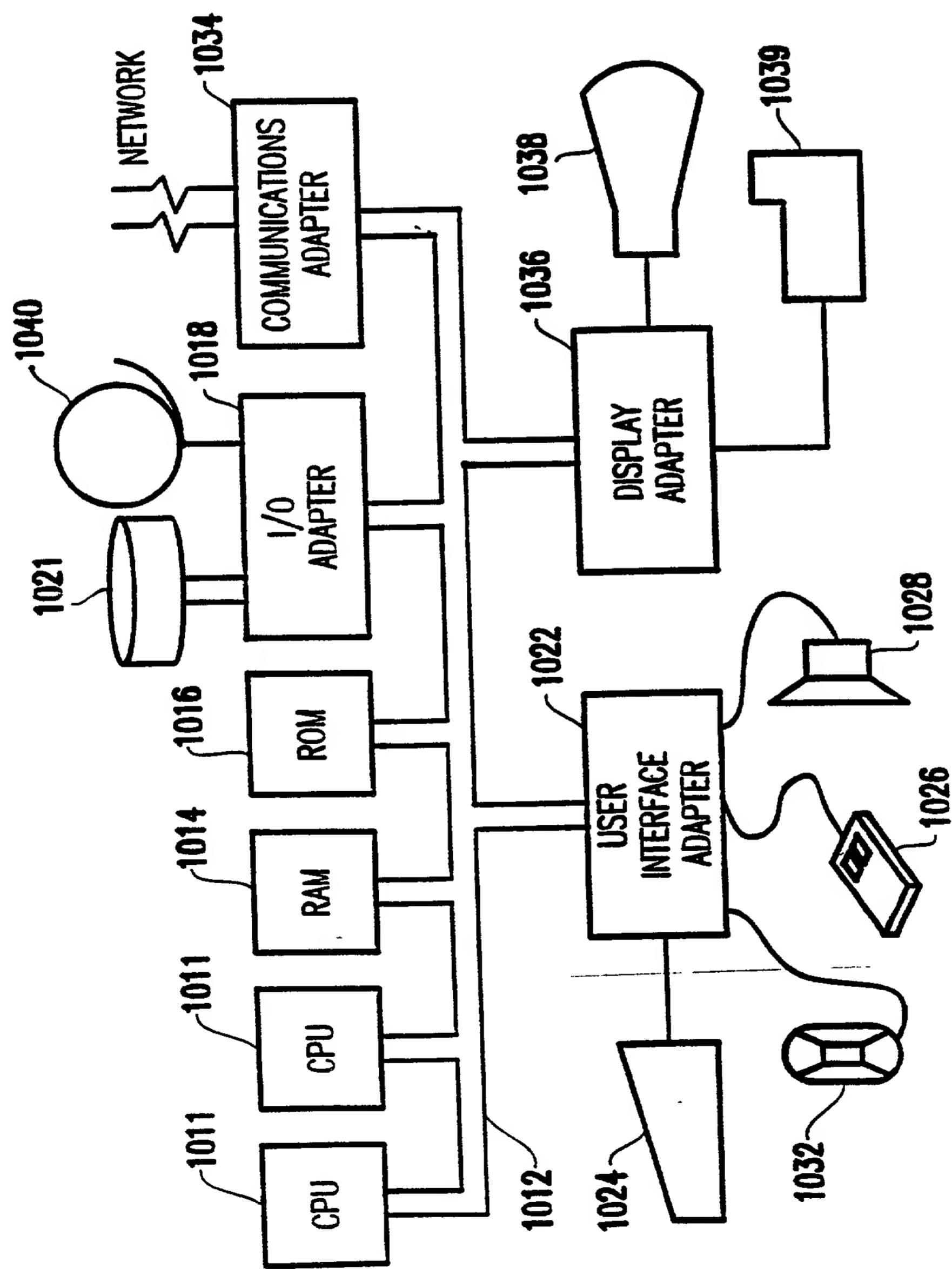


FIG. 10

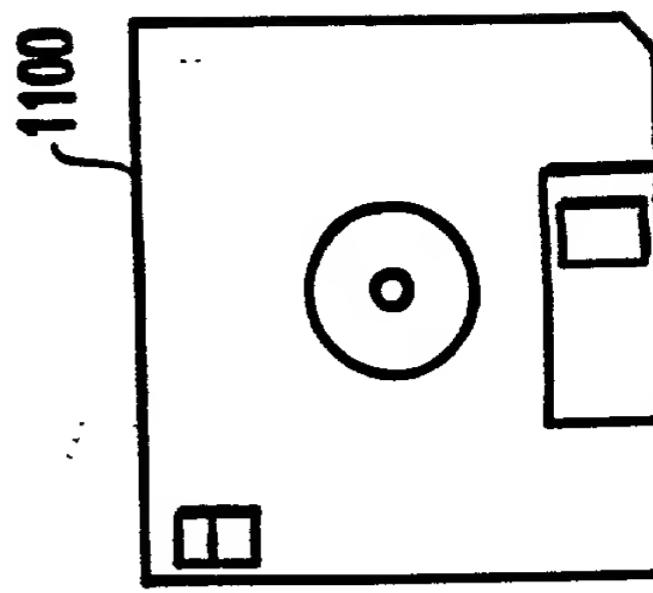


FIG. 11